

## **REMARKS**

Claims 1-25, 29-53, and 55-58 are now pending in the application, of which claims 23-25 and 29-53 have been withdrawn from consideration. Claims 1-22 and 55-58 have been amended. Applicants have amended the foregoing claims in principal to overcome the Examiner's rejection of the claims under 35 U.S.C. § 112. Further remarks regarding these §112 objections/rejections and the §103 prior art rejections are set forth below. The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the remarks contained herein.

### **CLAIM OBJECTIONS**

Claims 1 and 55 are objected to for containing the characters "(PEM)" in the claims. The Examiner states that the parenthetical references should be removed from the claims so as to have a better understanding thereof.

Applicants have amended all of the claims in the application, including claims 1 and 55, to remove the characters objected to. Accordingly, Applicants respectfully request the Examiner to reconsider and withdraw the instant objection to the claims.

### **REJECTIONS UNDER 35 U.S.C. § 112**

Claims 1-22 and 55-58 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The term "substantial portion" is a relative term which renders the claim indefinite.

Applicants have amended independent claims 1 and 55 to clarify the term “substantial portion” as being “an electrically conductive coating deposited on and contiguously coating said plurality of lands.” The claims as amended particularly point out and distinctly claim an electrically conductive coating that is deposited on and contiguously covers the major working surface to provide electrical conductivity at the lands and production from the reactant gas in the channels.

Based on the foregoing, Applicants submit that claims 1 and 55 are allowable under 35 U.S.C. § 112. Applicants note that these amendments are based upon other dependent claims as originally filed, and thus, should not necessitate a further search of the prior art. For example, claims 13, 18, and 19-21 as originally filed recited features of the working surface such as flow fields, a series of channels, and a plurality of grooves that are similar to the corresponding features recited in amended claims 1 and 55. Additionally, claim 4 as originally filed recited that the coating provides electrical contact between the substrate and the electrode, which is similar to the recited feature that the coating provides electrical conductivity between the lands and the electrode. As another example, claim 3 as originally filed recite that the coating protects the metal substrate from the corrosive environment of the fuel cell.

#### **REJECTION UNDER 35 U.S.C. § 103**

Claims 1-3, 13-15, 18-22 and 55-58 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Li et al. (U.S. Pat. No. 5,624,769) in view of Gordon (U.S. Pat. No. 4,146,657). Claims 1-2 and 55-57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gyoten et al. (U.S. Pat. No. 7,005,205) in view of Gordon. Claims

4 – 12 and 16 – 17 are rejected under 37 U.S.C. 103(a) as being unpatentable over Li et al. in view of Gordon as applied to claim 1 above, and further in view of Applicant's Admitted Prior Art (heretofore 'the AAPA'). These rejections are respectfully traversed.

In the current Office Action, the Examiner has acknowledged, but not accepted, Applicants' arguments that (1) Gordon is not reasonably pertinent to the problem confronting Applicants and (2) the combination of Gordon with Li et al. and Gyoten et al. both (a) fails to teach all of the elements of Applicants claims and, in any event, (b) represents improper use of hindsight to arrive at the claimed combination. Additionally, the Examiner has sustained an improper line of reasoning that since Li et al. and Gordon et al. disclose the formation of metallic oxide films at the sites of discontinuities in the coatings applied to the contact elements (i.e., bipolar plates), Li et al. and Gyoten et al. also "fully support having a non-ferrous metal-oxide coating in direct contact with the gaseous reactants and the electrode part of the membrane electrode assembly."

Applicants respectfully submit that claims 1 and 55 are allowable over the combination of Gordon and either Li et al. or Gyoten et al. for the same reasons previously advanced and as further supported by the current amendments to these claims. While additional bases for traversing the Examiner's rejection of the claims are provided herein, Applicants respectfully request that the Examiner reconsider his obviousness rejection in view of the entire record, including the unrebutted declaration testimony and arguments advanced by Applicants. (M.P.E.P. § 2145). Applicants set forth a summary of Applicants' prior evidence and argument concerning nonobviousness in Response to the previous Office Action dated March 19, 2008. Rather than restating all of Applicants arguments, Applicants set forth below the

Examiner's comments in the current Office Action and a response intended to clarify Applicants arguments with respect to those comments. Where appropriate, Applicants also set forth any additional argument that is appropriate in view of the current amendments to the claims.

1. Examiner: “[T]he teachings of Gordon and Li et al are fully pertinent to one another and the field of applicant’s endeavor because Gordon is strictly concerned with providing a suitable electrically conductive layer to reduce electrical resistance in power generating devices such as a solar cell or in electrical devices. Thus, Gordon addresses the same technical difficulties confronted by both Li et al. and applicant including a reduction in electrical resistance in electrical or power generation applications. In anticipation of applicant’s response that there is no specific suggestion or teaching in the references to combine the prior art..KSR...forecloses the argument is required to support a finding of obviousness.” (Paragraphs 9-10 and 21). “In this respect, because Gordon et al show such a characteristic <solar cell or the like>, it can be said that Gordon et al is suitable for any other power generating device comprising a unit cell such as a fuel cell.” (Paragraph 18).

At the outset, Applicants note that to rely on a reference under 35 U.S.C. § 103, the reference must be analogous art. MPEP 2141.01(a). The decision in *KSR* has not changed this threshold requirement. While Applicants have argued that there is no teaching or suggestion in the references to combine them, Applicants have also provided specific reasons why one of ordinary skill in the fuel cell art would not consider Gordon reasonable pertinent to the problem addressed by Applicants, and therefore, why Gordon is not analogous art under the proper standard.

Applicants’ specific reasons include that the Examiner misconstrues the nature of the problem confronted by Applicants, as well as Li et al. and Gyoten et al. (Amendment dated 2/21/08 at pp. 16-17 citing Vyas Decl.). As a result, the Examiner relies on an impermissibly broad definition of the problem to be solved to arrive at the

conclusion Gordon is analogous art. See *Ex Parte Dussaud*, 7 U.S.P.Q.2d 1818 (Bd. Pat. App. & Int’f 1988) (Board held a reference nonanalogous to the applicant’s field of endeavor on the basis that the Examiner’s characterization of the “problem” to which the applicant’s invention was addressed was too broad). Importantly, the Examiner’s analysis does not account for significant differences between the structure and function of the conductive layers and the devices<sup>1</sup> disclosed by Applicants and Gordon, the limited characteristics of the conductive layer disclosed by Gordon, and the general knowledge of skilled artisans in the fuel cell field.

Based on the foregoing, Applicants respectfully submit that Applicants’ rebuttal evidence and argument of record demonstrate that Gordon is not properly considered analogous art.

2. Examiner: “[T]he present claims recite: (claims 1 and 55) ‘having an electrically conductive coating deposited on and covering said major working surface’...Thus, ...the foregoing limitation does not put forth that the ‘entire surface of said major working surface is covered by the coating’ as apparently argued by the applicant...In addition, all transitional phrases in independent claims 1 and 55 are open-ended, and DO NOT exclude various possibilities such as <sic> an embodiment ‘having an electrically conductive coating deposited on a partially or partly covering said major working surface’”. (Paragraphs 14-16).

Applicants respectfully submit that to distinguish the prior art, it is not necessary for Applicants’ claims to recite a coating which covers the entire major working surface of the contact element. The Examiner asserts that Li et al. and Gyoten et al. support having a non-ferrous metal-oxide coating in direct contact with the gaseous reactants and the electrode part of the membrane electrode assembly. (Paragraphs 9-10 and 16). As best

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<sup>1</sup> For example, Gordon discloses a non-conductive glass substrate, not an electrically conductive contact element as recited in the claims.

understood by Applicants, the Examiner's conclusion is based solely on the disclosure by Li et al. and Gyoten et al. of discrete metallic oxide deposits that may form on a barrier/protective layer beneath a topcoat layer of titanium nitride (Li et al.) or an electroconductive resin (Gyoten et al.) due to porosity in the topcoat layer and the corrosive effect of the fuel cell environment. Simply put, the Examiner's conclusion appears to rest on the assertion that Li et al. and Gyoten et al. disclose sporadic deposits of metallic oxides beneath a protective topcoat layer that are in direct contact with reactant gases. Thus, Applicants submit that the prior art does not disclose a contiguous protective topcoat layer formed of a doped metal oxide composition as recited in the claims.

Claims 1 and 55, as currently amended, recite a contact element having an electrically conductive coating deposited on and contiguously covering reactant gas channels and lands defined by a major working surface of the contact element, the coating including a doped metal oxide composition, wherein the coating provides a protective layer on the contact element from direct contact with a reactant gas in the reactant gas channels. Thus, Applicants submit that claims 1 and 55 clearly distinguish the doped metal oxide coating recited in the claims and the discrete deposits of non-conductive metallic oxides disclosed by the cited references. Applicants further submit that claims 1 and 55 clearly recite the pertinent working surfaces on which the coating is deposited and which the coating covers to form the contiguous protective layer on the contact element.

3. Examiner: *"Applicant has substantially maintained the line of arguments previously advanced, and have questioned the validity of the teachings of Gordon et al simply because Gordon et al does not disclose what applicant calls a fuel cell environment. Well, the fact is that applicant neither claims a fuel cell system. At most, applicant's invention is related to an electrochemical cell per se (see applicant's claims)."* (Paragraph 17).

Applicants respectfully submit that the claims are limited to claiming a fuel cell. The preamble to the claims contains the language “fuel cell.” Additionally, independent claims 1 and 55 recite the primary structure that is expected of the claimed fuel cell, such as a “solid polymer electrolyte having a permeable body containing a cation exchange membrane,” an “electrode”, “an electrically conductive contact element having a major working surface”, and a “reactant gas”. Further, the dependent claims include additional structure indicative of the claimed fuel cell, including the recitation of a “catalytic electrode” (e.g., claim 2), “a corrosive environment” of the fuel cell (e.g., claims 3, 58), a “fluid distribution element...comprising a flow field” (e.g., claim 13), “a series of channels” of a flow field (e.g., claim 18), a “flow field” comprising “lands defining a plurality of grooves for distributing fuel or oxidant” along the working surface (e.g., claims 19, 21).

While the Examiner is permitted to take a broad view of the claims, Applicants respectfully submit that the language of the claims, when properly construed, limits the claims to claiming a fuel cell.

4. Examiner: *“Applicant’s assertion of unexpected results have been evaluated but found ineffective to overcome the prima facie case of obviousness as set forth above. For instance, in the declaration dated 01/21/08, applicant discusses “a bipolar plate assembly”, “fuel cell”, “metallic substrate”, “PEM membrane” and specific “doping level” and attributes certain unexpected results to embodiments/fuel cell system comprising the same. FINE. However, a close examination of the present claims pronouncedly reveals that the present claims clearly omit most of these features and/or elements.”* (Paragraph 19).

In sum, the Examiner asserts that Applicants do not recite the elements/features found to impart the unexpected results. Applicant has explained in its response as supported by the Vyas Decl. that the unexpected results include providing a stable (i.e., anti-corrosive) layer of tin oxide on a conductive metallic substrate used in a fuel cell that

exhibits low contact resistance between the tin oxide layer, the adjoining substrate, and other adjoining surfaces of the fuel cell, such that the tin oxide layer can pass current between the tin oxide layer and the adjoining surfaces. (e.g., Amendment dated 2/21/2008 at pp. 16-17 citing Vyas Decl.).

With the foregoing in mind, Applicants respectfully submit that claims 1 and 55 do include the key elements and features of the claimed fuel cell that impart the unexpected results. For example, claims 1 and 55 recite a coating that includes a doped metal oxide composition that provides a contiguous protective layer on the contact element and provides electrical conductivity between the working surface of the element and an electrode. Such a use of a doped metal oxide compositions in a fuel cell was not predictable given the caustic environment of a fuel cell, the general knowledge concerning metal oxide compositions, and the conventional wisdom and approach in the field. (See Amendment dated 2/21/2008 at pp. 17-19 citing Vyas Decl.).

Applicants further submit that the remaining dependent claims further define the key elements and features recited in claims 1 and 55. For example, claim 22 specifies a particular doping level that may be used to achieve the claimed resistivity. Thus, claims 1 and 55, either alone and/or in combination with the claims dependent therefrom, recite the key elements/features found to impart the unexpected results.

In sum, Applicants have offered evidence and argument to rebut the Examiner's assertion of prima facie obviousness and amended the claims to ensure the scope of the claims is commensurate with Applicants' argument. Applicants have also provided additional clarifying argument demonstrating that the teachings of Gordon cannot be properly combined with either Li et al. or Gyoten et al. to reject Applicants' claims.



Based on the foregoing and Applicants' prior arguments of record, Applicants respectfully submit that the Examiner's prima facie case of obviousness has been properly rebutted and that claims 1 and 55 are allowable over the combination of either Li et al. or Gyoten et al. with Gordon. The remaining rejected claims all depend, either directly or indirectly, from claim 1 or claim 55 and therefore are allowable for at least the same reasons. Accordingly, reconsideration and withdrawal of the Examiner's rejections of claims 1-22 and 55-58 are respectfully requested.

### **CONCLUSION**

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action and the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

/David A. McClaughry/

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